

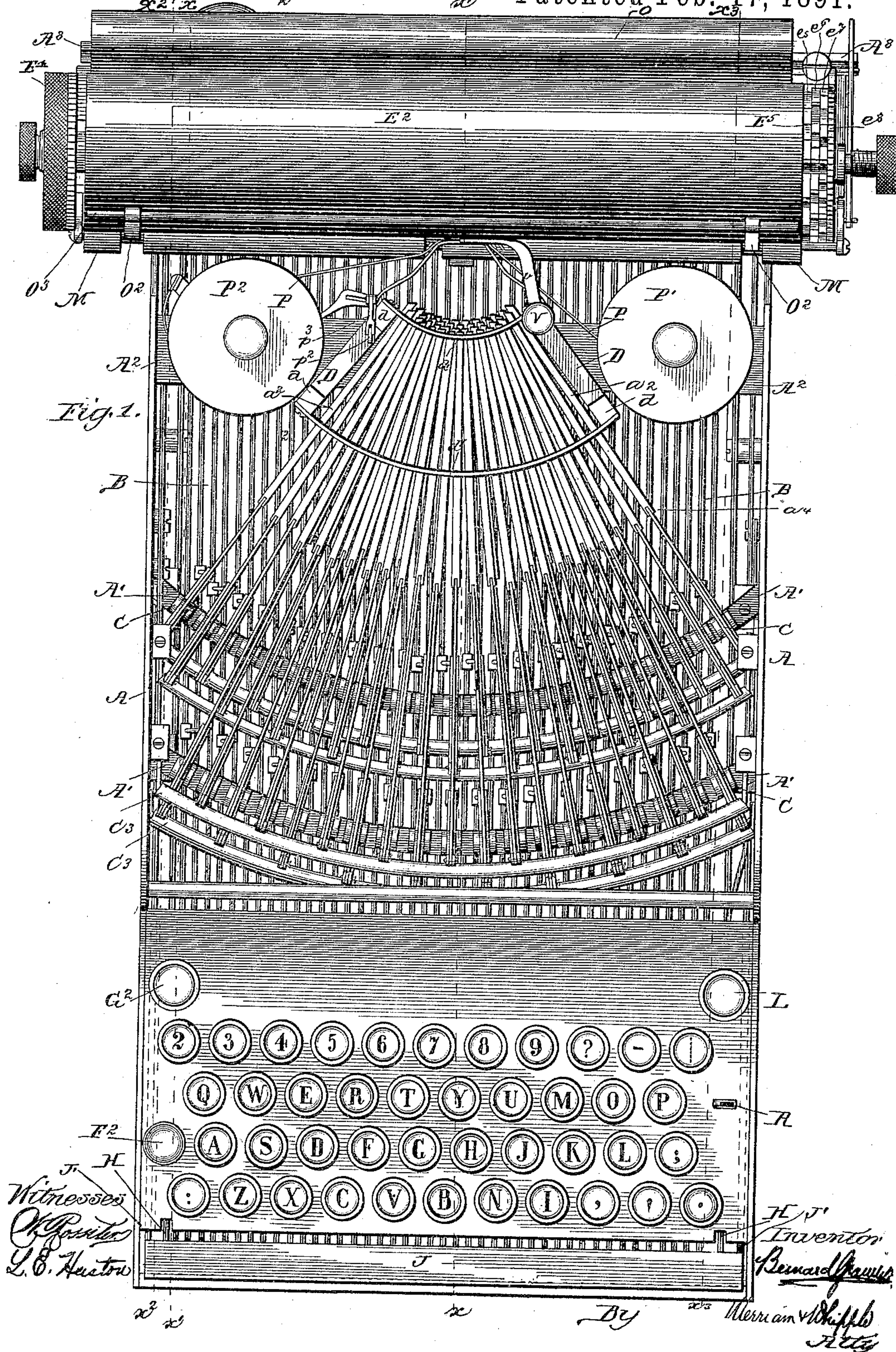
(No Model.)

7 Sheets—Sheet 1.

B. GRANVILLE.
TYPE WRITING MACHINE.

No. 446,676.

Patented Feb. 17, 1891.



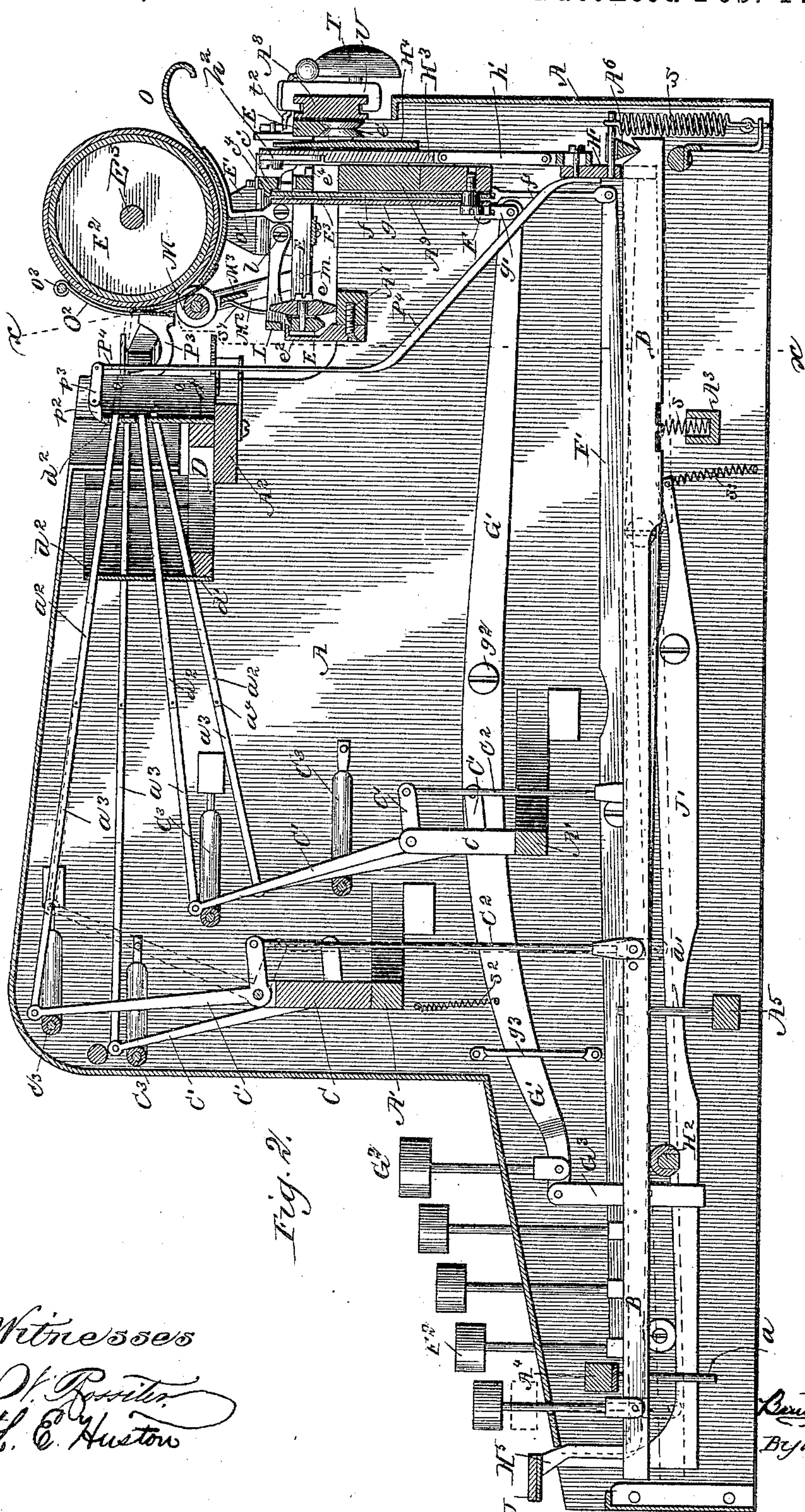
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7 Sheets—Sheet 2.

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Witnesses

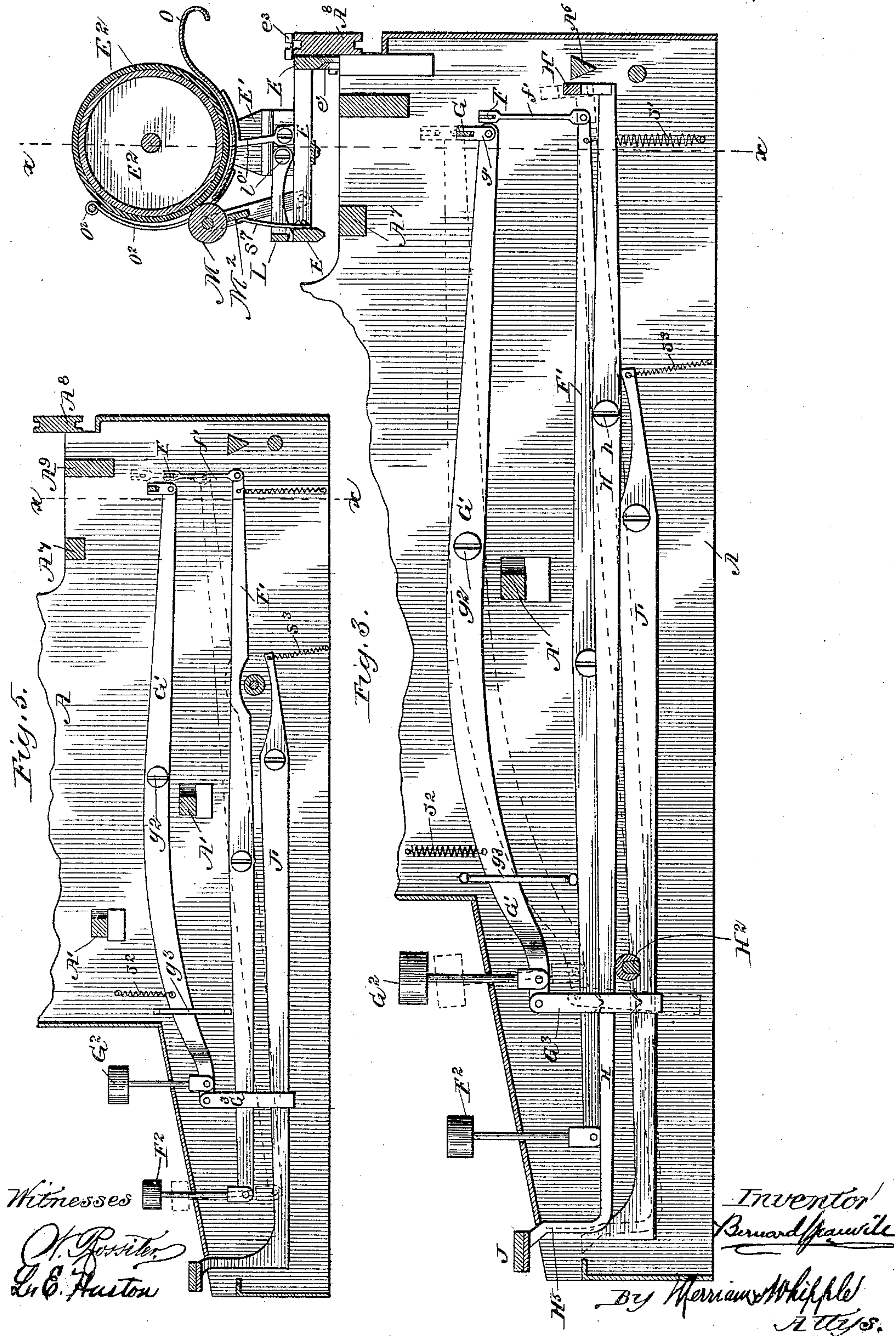
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By *William Whipple*
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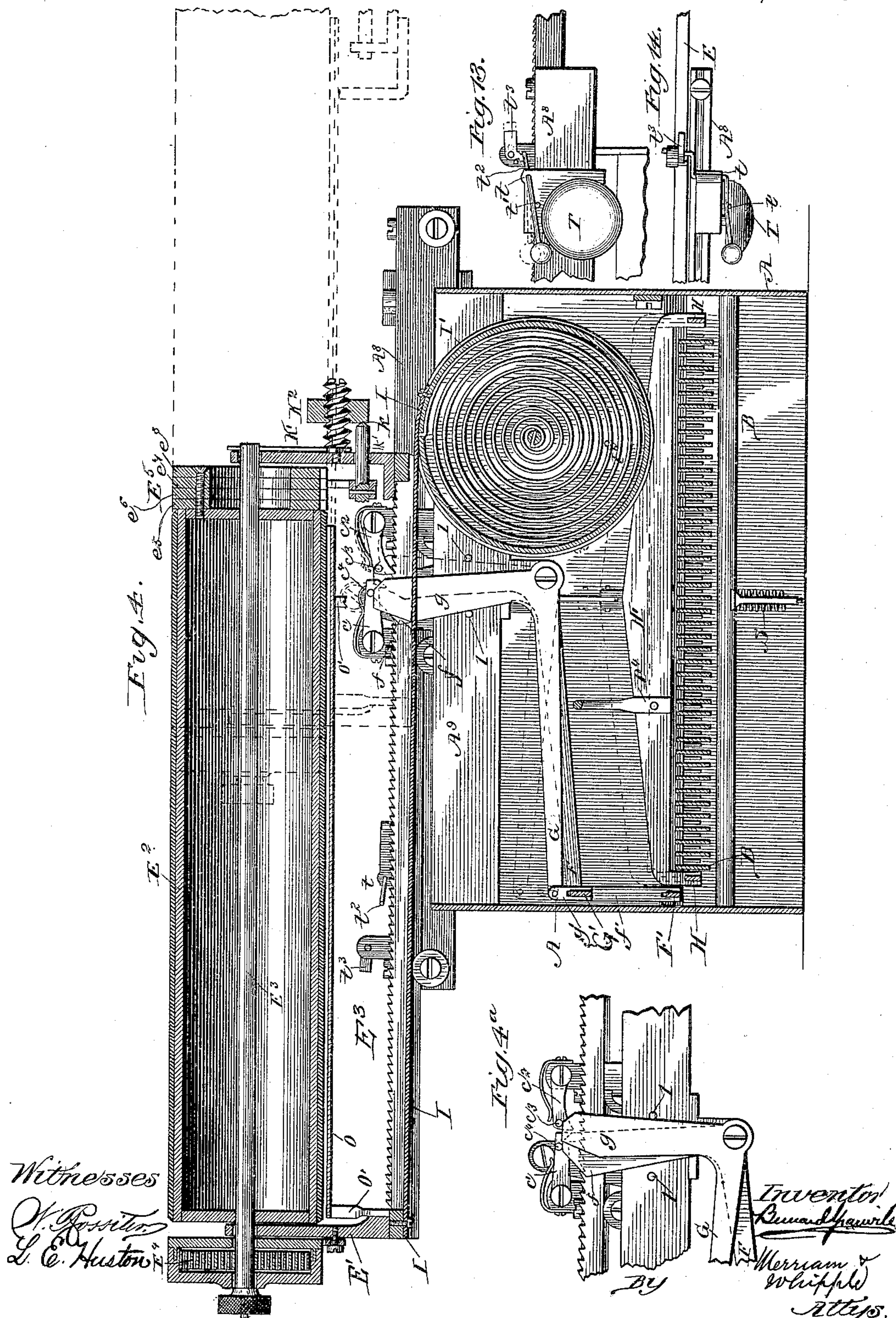
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7 Sheets—Sheet 4.

B. GRANVILLE.
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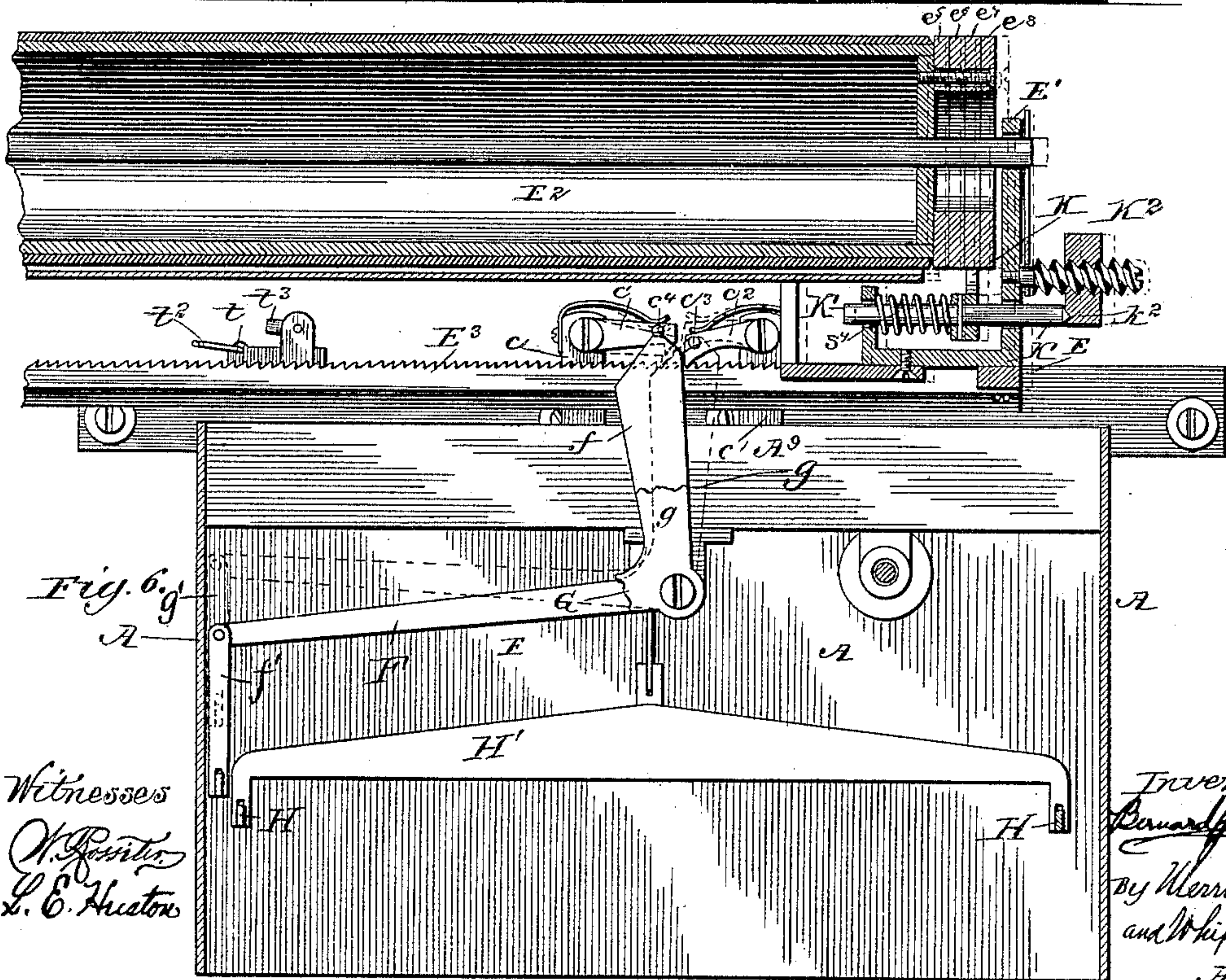
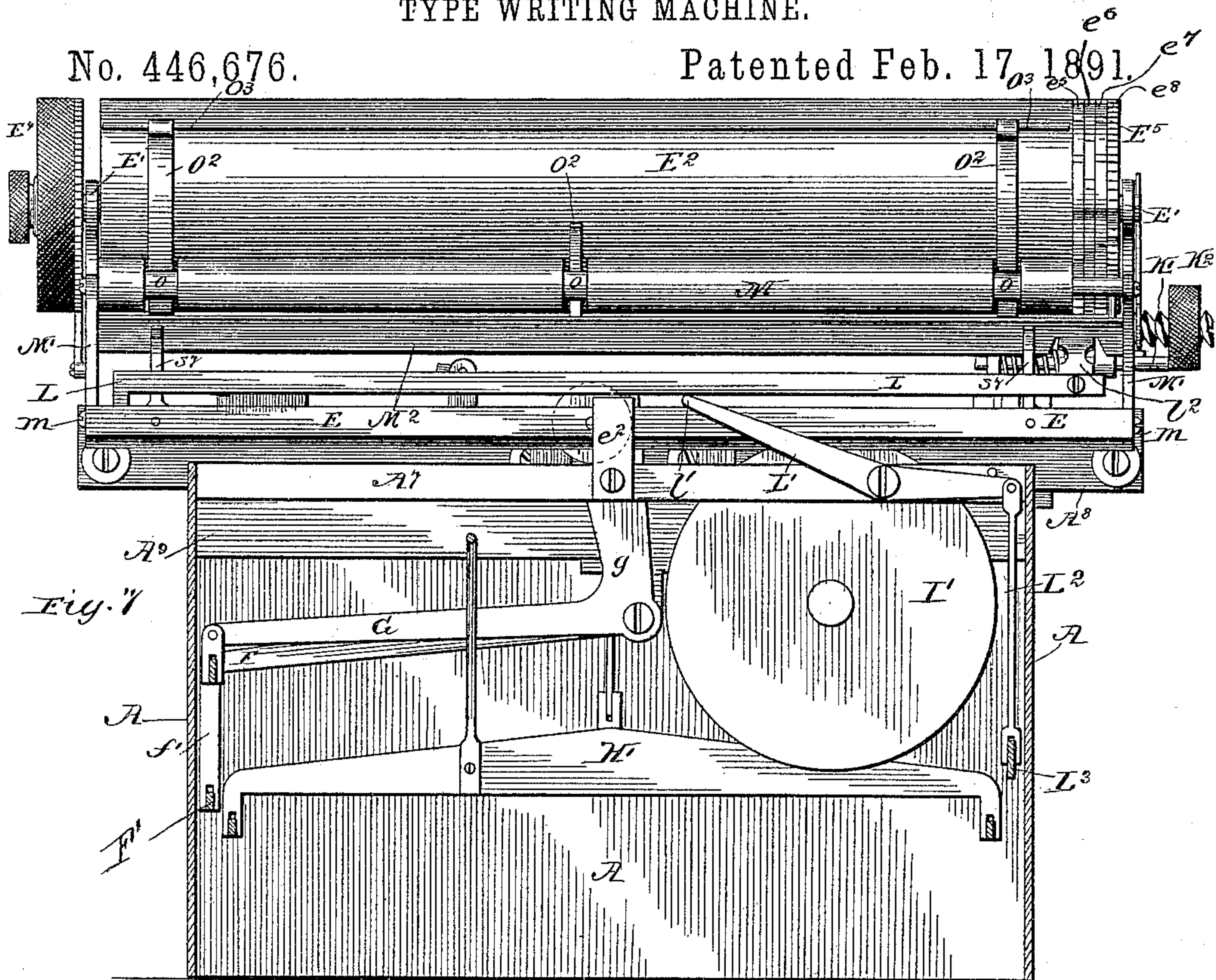
(No Model.)

7 Sheets—Sheet 5.

B. GRANVILLE.
TYPE WRITING MACHINE.

No. 446,676.

Patented Feb. 17, 1891.



Witnesses
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(No Model.)

7. Sheets—Sheet 7.

B. GRANVILLE.
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Patented Feb. 17, 1891.

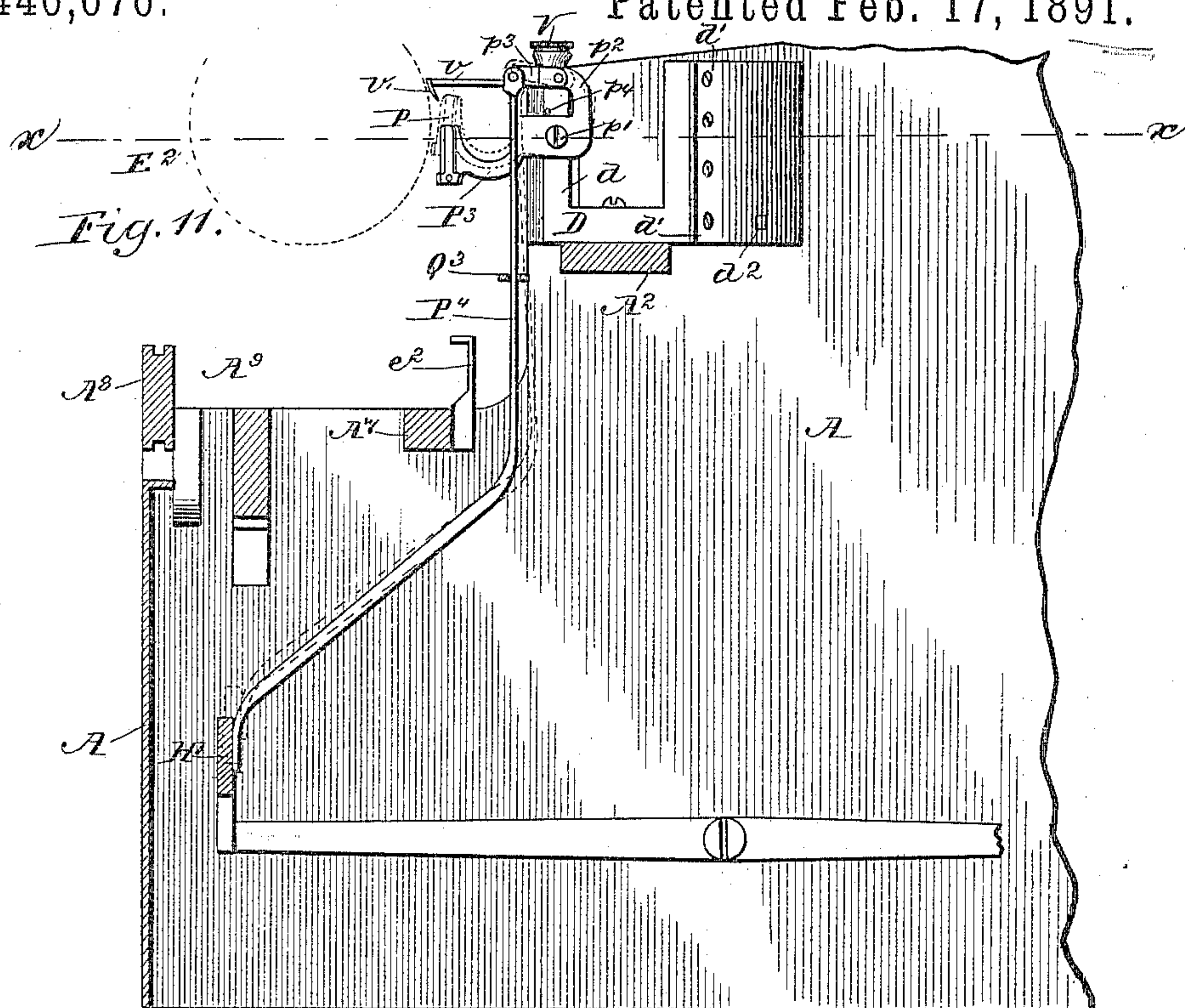
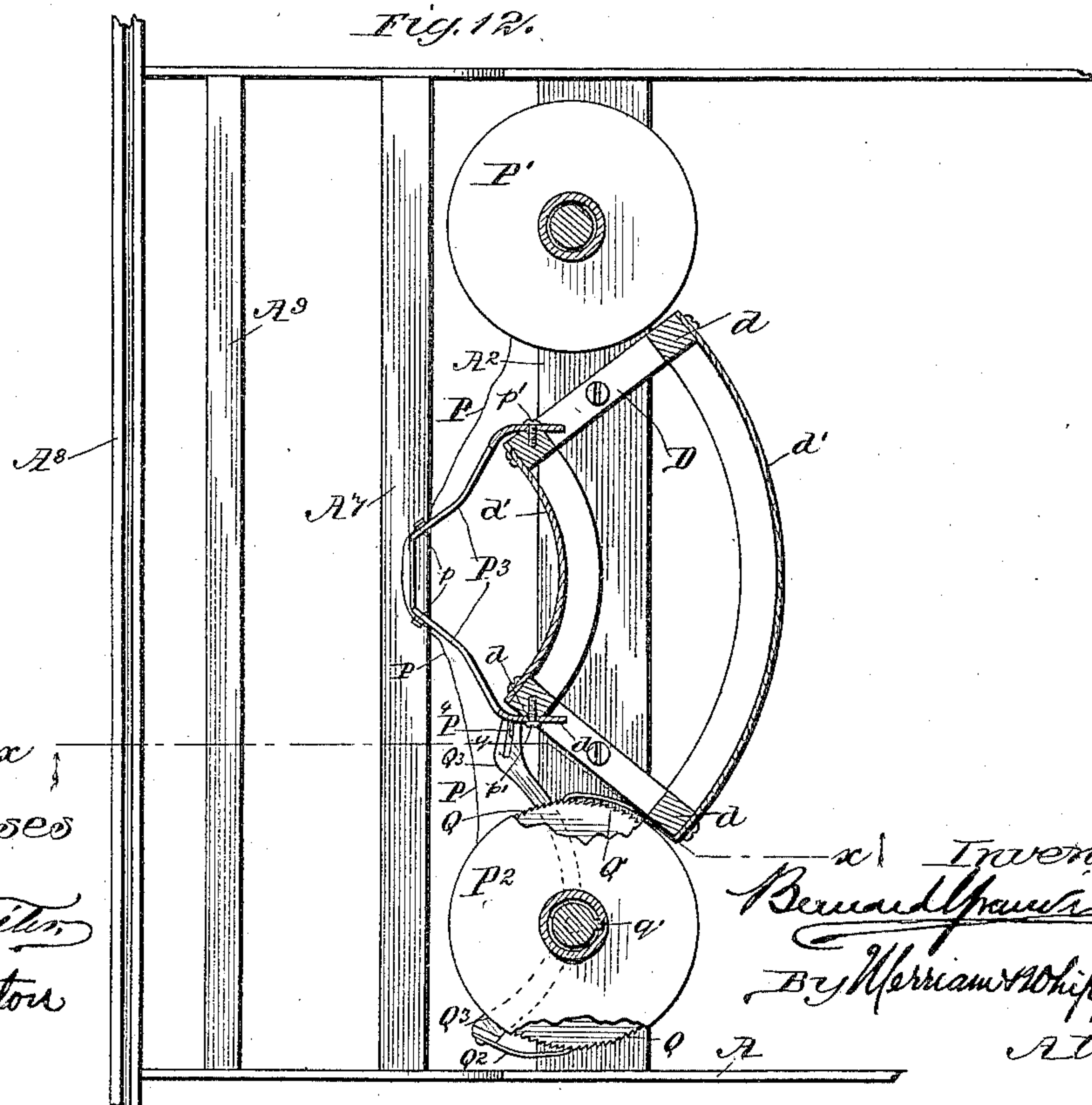


Fig. 12.



Witnesses

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x! Twentieth
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 Attys.

UNITED STATES PATENT OFFICE.

BERNARD GRANVILLE, OF CHICAGO, ILLINOIS.

TYPE-WRITING MACHINE.

SPECIFICATION forming part of Letters Patent No. 446,676, dated February 17, 1891.

Application filed June 7, 1888. Serial No. 276,323. (No model.)

To all whom it may concern:

Be it known that I, BERNARD GRANVILLE, of Chicago, in the State of Illinois, have invented certain new and useful Improvements in Type-Writing Machines, of which the following is a specification.

The invention relates to improvements upon the machine shown in United States Letters Patent No. 382,036, issued to me May 1, 1888; and it consists in the mechanism and combinations hereinafter particularly described, and pointed out in certain specified claims.

The invention is illustrated in the accompanying drawings, in which—

Figure 1 is a plan view of the machine, the cover being removed to expose the internal mechanism. Fig. 2 is a vertical longitudinal section taken on line xx of Fig. 1, looking toward the left, the cover being on. Fig. 3 is a fragment of a vertical longitudinal section taken on line $x'x'$ of Fig. 1, looking toward the left, and shows in side elevation the levers for operating the letter-spacing mechanism independent of the mechanism for operating the type-bars, the lever for operating the mechanism for returning the carriage to begin a line, and the manner of connecting said last-named lever with a rocking frame which has connection with the key-levers. The working of said first-named lever and of the rocking frame is shown in dotted lines. Fig. 4, Sheet 4, is a transverse vertical section on line xx of Fig. 3, looking toward the right, and shows cam-levers with which are connected the levers shown in Fig. 3 for operating the letter-spacing and carriage-returning mechanisms, the pawls for controlling the movements of the carriage, and other parts of the machine, the dotted lines indicating working positions of movable parts. Fig. 4^a is a fragmentary view showing both of the pawls for controlling the movements of the carriage raised and the position of the cam-levers relatively thereto. Fig. 5, Sheet 3, is a vertical longitudinal section on line x^2x^2 of Fig. 1, looking toward the left, and shows in full and in dotted lines the working of the lever for returning the carriage one letter-space at a time. Fig. 6 is a transverse vertical section of the machine on the line xx of Fig. 5, looking toward the right, being a section a little to the right of the line xx of Fig. 3, the purpose being to

show parts not seen in Fig. 4 and to show the working of the pawls for returning the carriage one letter-space at a time to correct mistakes in printing. Fig. 7, Sheet 5, is a transverse vertical section on line xx of Fig. 2, looking toward the right, and shows the carriage in front elevation. Fig. 8 is a fragment of a longitudinal section on line x^3x^3 of Fig. 1, looking toward the right, and shows the lever for operating the line-spacing mechanism and a device for holding the vibrating frame in its lowered position, the dotted lines showing the lowered position of said lever and vibrating frame. Fig. 9 is an end view of the paper-roller, and shows the arrangement of the lever for releasing the paper-clamp and for releasing a spring-pawl for holding the paper-roller in check when the paper-clamp is released. Fig. 10 is a front fragmentary view with a portion of the carriage-ratchet broken away to show the working of the letter-spacing mechanism. Fig. 11 is a fragmentary longitudinal vertical section on line xx of Fig. 12, looking in the direction of the arrow, and shows in side elevation the frame for supporting the type-bars and the means for operating the ribbon-holder. Fig. 12 is a horizontal section on line xx of Fig. 11, and shows in plan view the ribbon-spools and mechanism for operating the same, and also the frame for supporting the type-bars. Fig. 13, Sheet 4, is a rear elevation of a detail, showing the bell and its operating-cam. Fig. 14 is a detail showing in plan view the same parts which are shown in Fig. 13.

A designates the outer frame of the machine, which is made of plate metal and provided with cross bars or stays A' and A^2 for strengthening the same and providing a support for working parts.

The key-levers B are placed at the bottom of the frame, each of them being independently supported vertically by a spring s , rested on a cross-bar A^3 , which is attached at each of its ends to the frame A. At the front end of the frame is a cross-bar A^4 , which is provided with a series of teeth a , as a comb, projecting downward, and farther toward the rear is another cross-bar A^5 , attached in like manner to the frame, with similar teeth a' projecting upward. The front ends of the key-levers are placed between these

teeth and work up and down, the teeth affording lateral support thereto. The rear ends of the key-levers are held down on the springs s by a cross-bar A^6 , so that the depression of a key will compress the spring s under the key-lever to which such key is attached without raising the rear end of such key-lever, and the return of the spring when the key is released raises the key to its normal position.

To the cross-bars A' are attached studs C , and to the tops of these studs are pivoted a series of bell-crank levers C' , the lower arms of which are connected by rods or links C^2 to the key-levers. The upper or long arms of the bell-crank levers are connected to the type-bars a^2 , Figs. 1 and 2, by links a^3 , there being a flexible joint at a^4 , the point of the connection of these links with the type-bars. The studs C are of different heights and are alternated, first a lower and then a higher one, so that the bell-crank levers C' are brought into similar relative position, thus affording greater space between each pair at their ends than elsewhere and giving ample room for the play or movement of the joints at their connection with the links a^3 and C^2 without interference with each other.

To the cross-bar A^2 is attached a frame for the type-bars, which consists of a plate D , Fig. 12, provided with four posts d , to the front and rear pairs of which are attached plates d' , provided with square or angular holes d^2 , Fig. 11, for the type-bars to rest and slide back and forth in. These holes are so arranged that the type-bars therein will all converge, so as to strike the same point when separately pushed backward in said holes to the platen. The type-bars are thus supported independently of the key-levers and bell-crank levers C' , and the jointed connection of the links a^3 to the type-bars affords an easy end-wise play to the latter without lateral strain, the joints at a^4 being free to bend, so as to allow the opposite ends of said links to move in harmony with the outer ends of the long arms of said bell-crank levers.

C^3 designates bars extending across the machine and operating as stops to the long arms of said bell-crank levers.

At the rear end of the machine is a track or way consisting of cross-bars A^7 A^8 , which are attached to the frame A to support the carriage.

The carriage consists of a rectangular frame E , the end pieces of which are provided with uprights E' , in which the shaft E^3 of the paper-roller E^2 is journaled. On one side of the carriage-frame is a roller e , which runs on the cross-bar A^7 , and on the other side said frame rests on the top of grooved rollers e' , which are attached on short spindles projecting from the side of the cross-bar A^8 . To prevent the carriage from being displaced from the track, an arm or lug e^2 is fastened by a screw to the cross-bar A^7 , the upper end of which arm projects over the top of the side rail

upon that side of the carriage, and on the other side screws e^3 , Fig. 3, set in the upper edge of the cross-bar A^8 , with their heads projecting over the top of the side rail of the carriage, keep it in place. The carriage-frame has a ratchet-bar E^3 , which has teeth along its upper edge in the usual form, and teeth e^4 , Fig. 10, along the rear side, by means of which the movements of the carriage are governed, as hereinafter described.

To a cross-bar A^9 of the frame of the machine there are attached two studs c , to one of which is pivoted a spring-pawl c' , provided with a hook-like point, and to the other of which is another spring-pawl c^2 , both of said pawls when let down being adapted to antagonize the inclined teeth on the upper edge of the ratchet-bar E^3 and prevent the movement of the carriage-frame toward the right, but not toward the left. Said pawl c^2 is normally in contact with said ratchet-bar; but the said pawl c' is held normally out of contact therewith by the upwardly-projecting arm f of a cam-lever F , which bears on a pin c^4 on the pawl. The lever F is connected by a link f' to a lever F' , having a key F^2 at its front end. By depressing this key the long arm of the cam-lever is raised and the arm f thrown to the right. This allows said pawl c' to spring down into engagement with the teeth of said ratchet. This movement of said arm f , by reason of its beveled or cam-shaped surface on the side toward the pawl c^2 , coming under a pin c^3 , projecting therefrom, raises said last-named pawl out of contact with said ratchet-bar immediately after the engagement of said pawl c' therewith, and on the release of the key F^2 a spring s' , Figs. 3 to 5, reverses the movement of said arm f and allows the pawl c^2 to return and come to normal engagement with the ratchet-bar and through the bevel or cam-face on the side toward the pawl c' , coming under pin c^4 thereof, returns the latter pawl to normal elevated position. The pawl c^2 is also raised out of contact with said ratchet-bar by another upwardly-projecting arm g of a distinct cam-lever G , connected by a link g' to a lever G' , having a key G^2 at its front end. The depression of this key throws the arm g to the right, and its cam-surface engages the pin c^3 of said pawl and raises it in the same manner as said arm f does, and a spring s^2 reverses the movement of lever G' , and thereby reverses said arm g and allows said pawl to return to normal position. The projection of the pin c^4 of pawl c' is not sufficient to reach arm g , and therefore it has no effect on the latter pawl. Pins l , set in the cross-bar A^9 , operate as stops to the arms f g . The lever G' is pivoted at g^2 to the side of the frame and moves in a slot in the part g^3 , which operates as a guide. It also has a downwardly-projecting rod G^3 , the lower end of which rests on the rocking frame.

The vibrating frame consists of two side bars H , pivoted at h to the sides of the frame

A, a cross-bar H' at the rear end connected to the side bars H , so as to lie above the plane of the side bars and come above the key-levers B , and it also includes a cross-bar H^2 , near the front end, connected to the side bars H , so as to lie below the plane of the side bars and come under the key-levers at the front. To the cross-bar H' is connected by a link h' a sliding plate H^3 , which is held against the cross-bar A^9 by a cap-plate H^4 , having a groove in which said sliding plate moves up and down with the movement of the rocking frame. To the upper end of said sliding plate is pivoted an actuating-pawl consisting of a vibrating spring-pressed piece h^2 , Fig. 10, the lower end of which plays laterally in the groove of said cap-plate. The face of said piece comes against the ends of the teeth e^4 , which project from the rear side of the carriage ratchet-bar, and there is projecting therefrom a feather-cam h^3 , which works between said teeth. Said feather-cam is placed diagonal to the groove of said cap-plate, and during its upward movement the spring of the piece h^2 permits the lower end of said piece to be moved toward the left sufficient to allow said feather-cam to pass upward between said teeth without moving the carriage; but as soon as said feather-cam rises above said teeth the spring throws the lower end of said piece to the right against the wall of said groove, so that the downward movement will force the feather-cam against the tooth immediately below it, the point passing down between the wall of the groove and the tooth, and thereby move the carriage one tooth toward the left by the downward movement of said feather-cam. This is shown in Fig. 10 of the drawings, which shows a front view of the carriage ratchet-bar, (the side which faces the operator,) the central part in front of the cap-plate and the sliding plate being broken away, so as to show a sectional view of the teeth e^4 , taken on the line of the rear face of the carriage ratchet-bar. The feather-cam is here seen in its lowest working position. As the carriage is thus moved one notch to the left, the pawl c^2 rides over one of the teeth on the top of said ratchet-bar and falls into the next notch, so as to retain the carriage in position for the printing of the next letter.

The carriage-frame is connected by a chain or belt I to a disk or wheel I' , Figs. 4 and 9, which is operated by a barrel-spring I^2 , arranged so as to be compressed by the movement of the carriage toward the left during the operation of printing a line, the returning power of the rocking frame—the spring S —as brought to bear on the feather-cam being sufficient to compress the barrel-spring and move the carriage in opposition thereto, and the pawl c^2 holding the carriage against the barrel-spring when free from the control of the feather-cam. The carriage is thus held stationary during the depression of the rocking frame, and is moved one notch to the left by the return of said frame to normal posi-

tion. By the depression of the rocking frame the feather-cam is raised above and freed from contact with the teeth e^4 , and when held in this position the pawls c' c^2 may be worked, by means of key F^2 and its connecting-levers before described, for the purpose of moving the carriage to the right. The depression of said key lowers the pawl c' and raises the pawl c^2 in such manner as to allow one tooth of the ratchet to pass them, and the carriage, under the pressure of the barrel-spring, being relieved of the pressure in the opposite direction by the elevation of the feather-cam, will move to the right through one letter-space, so that by repeated depressions of said key the carriage can be moved back to the proper point anywhere in a line to correct a mistake in the printing, and by means of the key G^2 and its connecting-levers the pawl c^2 is raised without lowering the pawl c' . This key is connected with the rocking frame, as before described, so that when depressed it also depresses said rocking frame and raises the feather-cam and pawl c^2 together, and the carriage then moves to the right to the end of the line, said key being held down until the movement is completed. Each of the key-levers B is also connected with the rocking frame by having its lower side rested on the top of the cross-bar H^2 of said rocking frame, so that the depression of any key-lever to print a letter rocks said rocking frame and elevates the feather-cam into position, so that the return thereof to normal will move the carriage one letter-space to the left. The rocking frame also has the side bars extended back and bent up at H^5 , so as to come against the under side of the space-bar J , which is supported on side bars J' , pivoted to the sides of the frame A and having a spring s^3 on one side to hold the space-bar up when the rocking frame is rocked by a key-lever or by key G^2 .

The paper-roller E^2 is attached to a shaft E^3 , one end of which is provided with a barrel-spring E^4 , Fig. 4. The casing of this spring is provided with a ratchet and spring-pawl of the ordinary construction to secure the winding of the spring, which is arranged to turn the paper-roller in the direction required to move the front side adjacent to the rear ends of the type-bars upward, so as to carry the paper up to make the space between lines. To the opposite end of the paper-roller is secured an escapement-wheel E^5 , which has a wide peripheral face provided with three rows e^5 e^6 e^7 of teeth, having the space between the teeth varied in each row to give different spaces between the lines of printing, the first row e^5 giving the greatest space, the last e^7 the shortest, and the middle one e^6 an intermediate space. The escapement-lever K , Figs. 8 and 9, is secured to a sliding rock-shaft K' , Fig. 4, which is pressed lengthwise in one direction by a spring s^4 , Fig. 6, and in the opposite direction by a thumb nut K^2 , whereby the shifting of the nut is made to shift the position of the escapement-lever, so as to bring

it into working position with any of the different-spaced rows of teeth. The pitch of the thread on which said thumb-nut works is such as to shift the escapement-lever from one space to another at one complete revolution of the nut, and the nut has a recess k^2 in the path of the end of shaft K' thereon, into which recess the blunt spindle-pointed end of said rock-shaft is forced by spring s^4 to cause a slight stop at the completion of the revolution.

A spring s^5 , Fig. 8, is set into one arm of the escapement-lever, the other end bearing on the frame k' , in which the rock-shaft K' is journaled, in such manner as to keep the front pallet k^2 , Figs. 8 and 9, normally in contact with the escapement-wheel and the rear one k^3 free. A single rocking of said shaft K' allows but one tooth to pass the pallet k^2 , which checks the roller at the next, and thus fixes the space between lines according to the space between teeth in the particular row with which the escapement-lever is at the time working. The rocking of said shaft is effected by a vibrating frame L , which is pivoted at l , Figs. 2 and 3, upon each end of the carriage to the uprights E' , so that the outer part may be raised and lowered. To the cross-bar A' of the frame there is pivoted a lever L' , which has a pin or arm at l' , Fig. 7, which projects under the outer bar of said frame L . The opposite end of the lever L' is connected by a link L^2 to a lever L^3 , Fig. 8, which is pivoted at its rear end to the frame of the machine and at its front end is provided with a key L^4 , so that by depressing said key the link L^2 will be pulled down, drawing with it that end of lever L' to which it is attached and raising the frame L by the pin at l' on the opposite end projecting under the outer bar of said frame. Said frame has a lug or projecting part l^2 , which comes in contact with the escapement-lever K and moves the free end into contact with the escapement-wheel, thereby rocking said rock-shaft and disengaging the pallet k^3 and allowing one tooth to pass. The pallet k^3 checks the escapement-wheel as soon as the tooth passes the point of pallet k^2 and holds it until the escapement-lever is returned to normal, which takes place under the action of spring s^5 as soon as the key L^4 is released, and then the pallet k^2 checks it by engagement with the next tooth and holds it until there is another depression of key L^4 . A spring s^6 returns the lever L^2 and its connected parts to normal upon the release of said key.

The paper is held against the paper-roller by a spring-roller M , which is journaled in a frame consisting of end pieces M' and cross-bar M^2 , said end pieces being pivoted to the carriage-frame at m , so as to allow the roller M to be moved against and away from the paper-roller, and springs s^7 , attached to the carriage-frame and having their upper ends pressed against the cross-bar M^2 , hold said roller M normally in contact with the paper-

roller. To one of the uprights E' is pivoted a cam-lever N , the end n of which comes in contact when the lever is moved with a pin n' on one of the end pieces M' , and by moving the roller-frame out carries the roller M out from the paper-roller sufficient to allow the paper to be put in, and when said lever is thrown back to normal, as seen in Fig. 9, the springs s^7 , operating on the cross-bar M^2 , clamp the paper in, so that as the paper-roller is released by a depression of the key L^4 , as described, and makes a partial rotation the paper will be carried up through the distance of the space between lines.

In the rear of the paper-roller is a guide or chute O , consisting of a curved plate attached to and supported by standards O' of the carriage-frame. This chute extends down under the paper-roller, and at its front edge is provided with spring-arms O^2 , which extend up in front of the paper-roller for the purpose of directing the paper inserted between the chute and paper-roller so as to bring it up opposite to the rear end faces of the type-bars, and the outermost two of these spring-arms support a wire or small rod O^3 , placed in loops at their upper ends for holding the upper edge of the paper toward or against the paper-roller and for adjusting the straightness of the paper when inserted. The roller M has recesses at o in which the spring-arms lie. The outward movement of said roller allows the said spring-arms to spring out from the paper-roller a little to facilitate getting the paper in, and when in and said roller is returned to normal position said spring-arms are thereby brought close to the paper-roller, so as to hold the paper close up to or against the same.

The lever N operates on a spring-pawl N' , adapted to engage a ratchet e^3 for checking the movement of the paper-roller when the roller M is thrown off to put in paper, the said pawl being held normally out of contact with its ratchet by a pin n^2 on said pawl, which is cammed out by the cam n^3 of said lever when returning to normal and so held while in that position. By the operation of throwing off roller M said pin is released, and said pawl is then permitted to come into engagement and check any movement of the paper-roller while the parts are in the position indicated.

The ink-ribbon P is wound on a spool P' and has a part extended therefrom to and under tension-clamps p and thence to a spool P^2 , upon which it can be wound as it is unwound from spool P' , being drawn through from under the tension-clamps.

The ribbon-holder P^3 , to which the tension-clamps are attached, is pivoted at p' to the rear posts d of the frame D for supporting the type-bars, and to the front of the pivoting-point has an upwardly-extended arm p^2 . To this arm there is connected a link p^3 , which has its rear end connected to the upper end of an arm P^4 , which latter arm is connected to the cross-bar H' of the rocking-

frame II and is deflected forward and raised slightly by the depressions of the front end of said rocking frame, as shown in dotted lines in Fig. 11. By the forward movement of said arm operating through the link p^3 the arm p^2 is thrown forward, so as to raise the ribbon-holder and carry the ribbon up over the printing-point just in advance of the approaching type, the construction and arrangement being such that the upward movement of the ribbon-holder is stopped by a stop-pin p^4 , Fig. 11, just before the type strikes the ribbon. The ribbon-holder returns so as to drop the ribbon below the line of print with the return of the rocking frame II to normal.

For the purpose of drawing the ribbon from the spool P' during the printing the shaft of the spool P^2 is provided with a ratchet-wheel Q at the bottom. On one side of the wheel Q , and attached to the frame D , is placed a spring-pawl Q' , arranged to prevent the rotation of said spool in one direction, and on the opposite side is placed a spring-pawl Q^2 , which is attached to the end of a lever Q^3 , that is pivoted to the cross-bar A^2 . The arm P^4 passes through a slot q in the opposite end of said lever, so that the backward and forward movements of said arm works said lever in such manner as to pull the pawl Q^2 forward on the ratchet over one or more of the teeth and then push it back, causing the shaft of said spool P^2 to turn as the printing is going on, and thus pull the ribbon slowly before the type, continually presenting a fresh part thereof to be printed from until the ribbon is unwound from spool P' and wound upon spool P^2 . The spools are then exchanged. P' being placed on the shaft of P^2 , which shaft is provided with a fixed spline q' , adapted to fit a corresponding groove in the boxing of the spools for causing the spool to turn with said shaft, the spool when on the opposite side being free to turn on a fixed spindle as the ribbon is unwound.

For the purpose of holding the rocking frame II depressed at the front a lever R is pivoted to the frame at r , so as to hang down alongside of one of the side bars of said frame and so arranged that by depressing said rocking frame and then moving the upper end of said lever outward the lower end will be brought over said side bar and hold the front end of said frame down until said lever is shifted back. This lever is used when the reverse spacer is to be used for some time.

To the rear side of the cross-bar A^8 is attached a bell T , Figs. 13 and 14, sliding in a groove, which can be shifted to signal at or near the end of a line. The bell is fixed by a set-screw. The hammer or tongue of the bell is pivoted at t and pressed toward the bell by a spring, the wire supporting the hammer resting on a pin t' . The part t^2 is depressed in passing a cam t^3 , attached to the carriage-frame E , so as to raise the hammer which strikes as soon as the part t^2 passes the cam.

The spring of the wire after striking pin t' allows the hammer to strike the bell and then retracts it sufficiently to prevent muffling.

An adjustable stop consisting of a sliding plate U , connected by a dovetail connection to the rear side of the cross-bar A^8 , Fig. 2, so as to slide thereon, is provided for stopping the carriage at the right place to begin the lines of print. This stop is fixed at the place desired by a thumb-screw, (not shown,) and there is a lug (not shown) on the carriage-frame, which comes in contact with the stop as the carriage is moved to the right and stops it at the proper point. To the top of one of the posts d there is pivoted a curved arm v , which is held or tightened in place by a thumb-screw V . By loosening the thumb-screw the said arm may be swung back from the paper-roller, when desired. At the tip end of the thin part of said arm lying parallel to the paper-roller there is a pointer v' , Fig. 11, extending downward and pointing directly to the printing-point, where the type strike said paper roller or platen. This enables the operator to see that the paper is in the right position relatively to any printing which may have been previously done thereon before beginning other work and obviates the use of scales.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a type-writer, and in combination, a laterally-movable carriage under constant stress tending to move it to the right and provided with a ratchet-bar, an actuating-pawl arranged to operate on said ratchet-bar to feed the carriage to the left, a rocking frame connected to said pawl for operating the same and releasing it from the ratchet-bar, two holding-pawls, one normally in and the other normally out of connection with the teeth of said ratchet-bar, a cam-lever, as F , arranged to act on said pawls to permit the carriage to move to the right step by step when the actuating-pawl is released, and a key-lever and connections therefrom to the said cam-lever, all substantially as described.

2. In a type-writer, and in combination, a laterally-movable carriage under constant stress tending to move it to the right and provided with a ratchet-bar, an actuating-pawl arranged to operate on said ratchet-bar to feed the carriage to the left, a rocking frame connected to said pawl for operating the same and releasing it from the ratchet-bar, two holding-pawls, one normally in and the other normally out of connection with the teeth of said ratchet-bar, a cam-lever, as F , arranged to act on said pawls to permit the carriage to move to the right step by step when the actuating-pawl is released, a key-lever and connections therefrom to the said cam-lever, a cam-lever, as G , arranged to act on the holding-pawl, and a key-lever and connections therefrom to the cam-lever G , all substantially as described.

3. In combination with the paper-cylinder of a type-writer, a spring for turning said cylinder, an escapement-wheel connected with said cylinder and having two or more rows of
5 teeth differently spaced on its periphery, an escapement-lever, laterally-movable and laterally-operating adjusting mechanism for said escapement-lever, a key-lever and frame
for rocking the escapement-lever, and intermediate mechanism connecting said key-lever to said frame, all substantially as described. 10

BERNARD GRANVILLE.

Witnesses:

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